Group Project 8
Sticking the Tank
Due Monday, April 25

*****Read this first!** – You will need to email your professor (me) to get the radius, R, and length, L, to use in your report. Be sure to do this early enough to get this data and complete your report. (e,g. if you email me at 11:00 PM, I probably will not get you the data until the following day.)

Project Assignment: Your group has been hired by the Environmental Protection Agency (EPA) to measure the level of toxic waste buried in tanks across a field. Most of these tanks are cylinders, with their axis horizontal. You are to "stick the tank" by inserting a stick through a hole in the center of the top until it touches the bottom, then pulling it out and reading off the liquid level showing on the stick. They have hired you because your group knows calculus; they have faith that you can convert the "height of the stick" reading to "filled volume in the tank."
Using the cross-sectional radius of the tank, R, and its length is L assigned by your professor, calibrate the stick for them. That is, convert height showing on the stick to volume of liquid. Check your results by doing the calculation in two separate ways.

1. Evaluate a definite integral that gives the filled volume in terms of the height, h, on the stick. (Hint: place the origin of your coordinate system at the center of the circular cross-section. Make a sketch!) Include your calculations in your report.

2. Use elementary geometry and trigonometry (no calculus) to obtain the volume. Explain your reasoning and result in your report.

3. Show that your results for 1 and 2 are equal.

Your group should print your report and turn it in by the due date. Please be sure to fill out and return a project assessment form with your report.